(No Model.) 2 Sheets—Sheet 1.

G. S. STRONG.

DEVICE FOR TRANSMITTING MOTION.

No. 471,656. Patented Mar. 29, 1892.

Fig. 1.

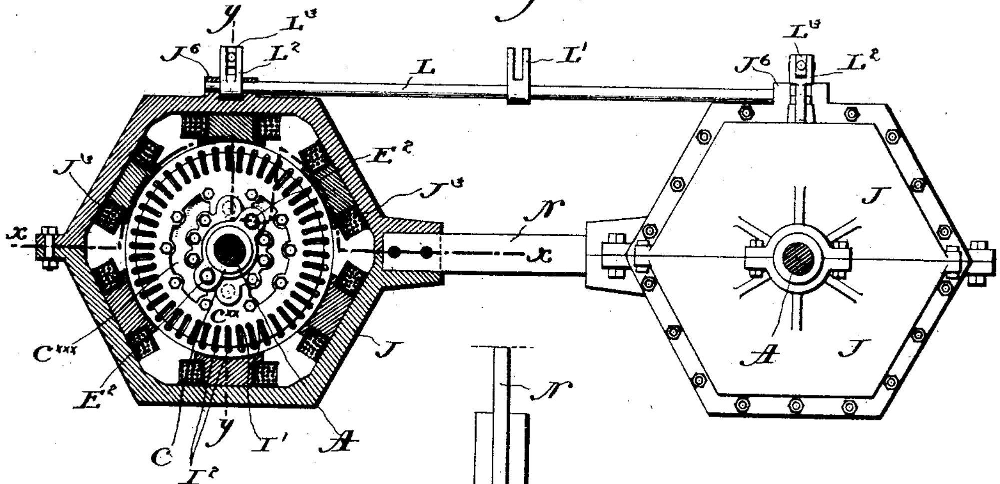
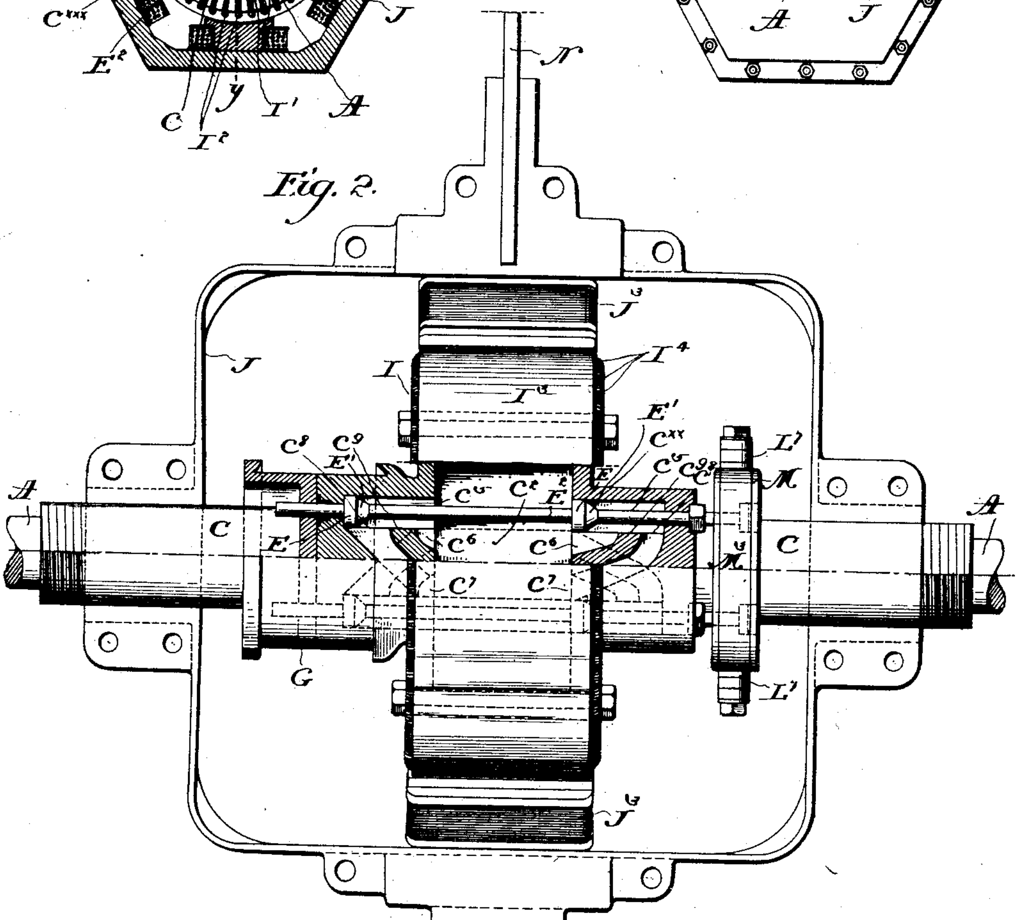


Fig. 2.



WITNESSES:

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INVENTOR:

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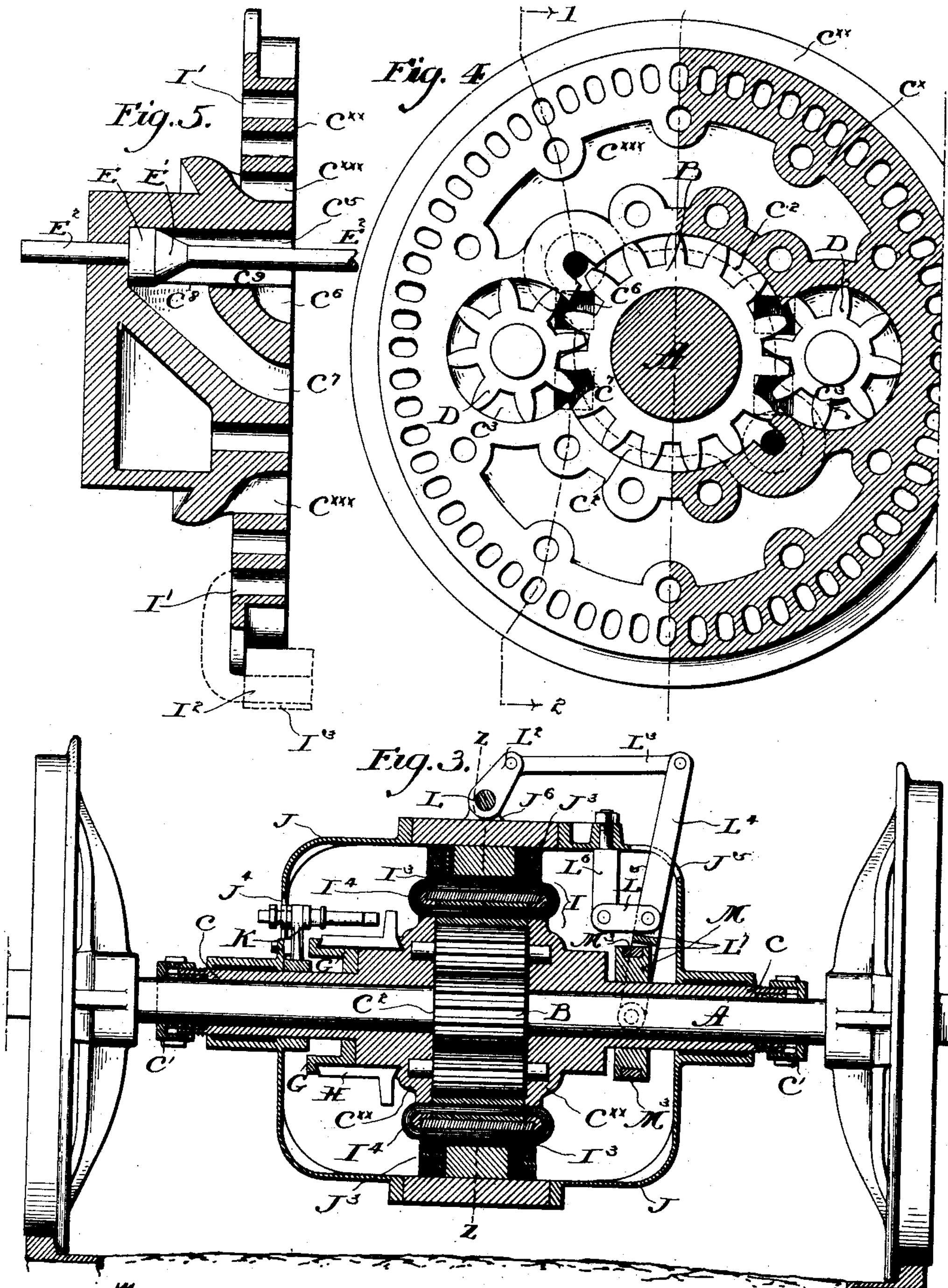

WITNESSES: David S. Williams, Joshua Matlack, Jr.

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UNITED STATES PATENT OFFICE.

GEORGE S. STRONG, OF NEW YORK, N. Y., ASSIGNOR TO JAMES N. GAMBLE, OF CINCINNATI, OHIO.

DEVICE FOR TRANSMITTING MOTION.

SPECIFICATION forming part of Letters Patent No. 471,656, dated March 29, 1892.

Application filed May 29, 1891. Serial No. 394,466. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. STRONG, of the city and county of New York, State of New York, have invented a certain new and useful Device for Transmitting Motion, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to devices for transmitting motion from one rotary body to another moving about the same axes of rotation, and particularly to devices used in connection with electric motors, the object of my invention being to provide what I may call a "fluid-clutch," by which the motion of the one body is transmitted to the other, and to combine with such mechanism devices for varying the resistance offered by the fluid and an electric motor.

In another application, filed May 29, 1891, Serial No. 394,465, I have shown and described the device to which this application refers, together with a modification of the same, but have not specifically claimed the particular mechanism to which this case refers.

The nature of this invention will be best understood as described in connection with the drawings, in which it is illustrated, and in which—

Figure 1 is a plan view showing two axles of a truck, each equipped with my invention and partly in section. Fig. 2 is an elevation of the part shown in Fig. 1, partly shown in section on the line $x\ x$ of Fig. 1. Fig. 3 is a cross-sectional view taken on the line $y\ y$ of Fig. 1; Fig. 4, an end view of the car-axle and the casing surrounding it and the side plate of the casing removed, and it is shown partly in section on the line $z\ z$ of Fig. 3; and Fig. 5 is a cross-sectional view taken through one of the end plates of the casing on the line 1 2 of Fig. 4.

A is a shaft, in the present case a car-axle, and B a gear-wheel secured to the said shaft. Around this gear-wheel is a casing consisting of two end plates $c^{\times\times}$, journaled on the shaft by means of sleeve extensions c and bolted to a casing center $c^{\times}$.

$c'\ c'$ are glands at the ends of the sleeve C. Obviously the casing-center may, if desired, be formed integral with one of the face-plates. In the casing made up as desired a chamber c^2 is formed, which fits neatly around the gear-wheel B, and in addition to said chamber one or more supplemental chambers c^3 are formed in the casing, which chambers communicate with the chamber c^2, as shown, and in which are situated gear-wheels D D, fitting neatly within their chambers and in engagement with the teeth of wheel B. The teeth of the engaged gear-wheels are formed so that they will segregate spaces between them as they roll together, and in the face-plates and on the line where the chambers c^2 and c^3 meet I form ports c^6 and c^7, the rear portions of which communicate, as shown. The port c^6 opens into a straight passage c^5, into which passage also the port c^7 opens at c^8. The communication between the ports is regulated by a valve E, preferably having a conical face E′, which when moved over the portion c^9 of passage c^5 closes said passage entirely and which, in intermediate positions, can be made to partly close said passage.

The chambers c^2 and c^3 are filled with a fluid, and it will be seen that as the teeth of gears B and D roll together, the fluid inclosed between the teeth will be forced out of the constantly-decreasing space, and will escape through one of the ports c^6 or c^7 into the other of said ports, from which it enters the space between the teeth as they move apart, and it will also be seen that when the connection between the ports is closed, the fluid cannot escape from between the teeth of the engaged gear-wheels, and therefore the wheels cannot rotate with respect to each other, but remain locked until the communication between the ports is restored. Now if the port communication be closed by the valve and either the shaft or the casing rotated, it is obvious that the rotation of the one will be directly communicated to the other, while, on the other hand, if the commu-

nication between the ports be open and the gears B and D permitted to rotate with respect to each other the one part of the coupler can rotate independently of the other.

As shown in the drawings, ports are formed opposite to each other in each face-plate of the casing, and the two valves E, controlling the communication between the ports in each face-plate, are connected with the same spindle E^2, which spindle is continued out through one face-plate, and secured to an annular ring M, which ring is fastened to a sleeve *c* of the casing, so as to rotate with it, but be free to move laterally thereupon. By moving the ring to or from the casing, the valves attached to the spindles or valve-stem are simultaneously removed.

The central part of the casing is surrounded by an annular rim cored out or having openings $c^{\times\times\times}$ between the said annular ring and the central chamber of the casing. Supported on the rim is an armature-core I^3, and through the rim inside of the part supporting the core-holes I′ are formed, through which and holes I^2 in the core are passed wire-windings, as indicated at I^4, in such manner as to convert the entire rim of the casing into an annular armature, which as a whole is indicated by the letter I.

Journaled upon the axle A, either directly or indirectly, and, as shown in the drawings, directly upon the sleeves *c* of the casing already mentioned, is a casing J, to and within which is secured the magnetic field J^3 of an electric motor, of which I is the armature. This casing is supported directly upon the axle or shaft A; but as it is not to rotate with the shaft, it must have another point of support to hold it stationary. This in the drawings is indicated by the brace N, connecting two casings J on adjacent axles. The casing J is made as tight as practicable, in order to protect the armature and magnetic field. One opening J^5 is formed in it, through which extends a lever L^4, having forked ends L^7, which are attached on each side of a ring M^3, surrounding the ring M, the lever being pivoted to a link L^5, pivoted in turn on a bolt L^6, secured to casing J. The upper end of lever L^4 is connected by a link L^3 with a lever-arm L^2, extending out from shaft L, journaled in a projection J^6 of casing J, and which shaft is actuated by another lever-arm L′, from which any convenient connection can be made to an operating lever or handle in convenient reach of the car-driver.

The commutator by which the current is taken from the armature is indicated at G H.

K indicates the support for the brushes, which is secured to casing J, and, as shown, extends out through an opening J^4 in said casing.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. As a device for transmitting motion, the combination of a shaft A, having a pinion B, a tight casing inclosing said pinion but free to turn on the shaft, said casing having a chamber c^2, fitting neatly around the pinion B, one or more communicating chambers c^3 and communicating ports c^6 c^7, arranged along the connecting-line at the end or ends of chambers c^2 c^3, as described, a pinion D, fitting neatly in each chamber c^3, arranged to engage pinion B, a valve or valves E, arranged to regulate the opening between ports c^6 and c^7, electro-magnetic armature-windings secured to the casing, and a relatively fixed magnetic field arranged around the casing, substantially as and for the purpose specified.

2. As a device for transmitting motion, the combination of a shaft A, having a pinion B, a tight casing inclosing said pinion but free to turn on the shaft, said casing having a chamber c^2, fitting neatly around the pinion B, one or more communicating chambers c^3 and communicating ports c^6 c^7, arranged along the connecting-line at the end or ends of chambers c^2 c^3, as described, a pinion D, fitting neatly in each chamber c^3, arranged to engage pinion B, a valve or valves E, arranged to regulate the opening between ports c^6 and c^7, electro-magnetic armature-windings secured to the casing, a relatively fixed magnetic field arranged around the casing, and a casing for the field-magnets journaled on the shaft.

3. As a device for transmitting motion, the combination of a shaft A, having a pinion B, a tight casing inclosing said pinion but free to turn on the shaft, said casing having a chamber c^2, fitting neatly around the pinion B, one or more communicating chambers c^3, a port c^5 c^6, extending at right angles from the end of the connecting-line between chambers c^2 and c^3, a port c^7, extending from the opposite end of said connecting-line and connected with the back end of port c^5, a pinion D, fitting in each chamber c^3 and engaged with pinion B, a valve-stem E^2, extending through port c^5, and a valve E, secured to said stem and adapted to close and regulate port c^5, as described.

4. The combination of a shaft A, a pinion B secured thereon, a tight casing journaled on the shaft, having a chamber c^3 to fit around pinion B, and chambers c^3 c^3, communicating with the chamber c^2, as described, pinions D D, fitting in chambers c^3 and in engagement with pinion B, ports c^6 c^7, formed in the side lines where chambers c^2 and c^3 communicate and connecting with each other, as described, valves E, arranged to regulate the communication between each pair of ports c^6 c^7, as described, valve-stems E^2, connecting said valves in pairs and extending out through the side of the casing, a ring M, secured to a sleeve *c* of the casing, so as to turn with it but be free to move laterally, said ring being attached to

end of valve-stem E^2, and means for moving ring M, all substantially as and for the purpose specified.

5. In combination with a shaft A, having a pinion B attached to it, a casing journaled on said shaft having chambers c^2 c^3, pinions D in chambers c^3, and ports formed as described, said casing having also an annular rim and openings $c^{\times\times\times}$, formed between the rim and central chamber c^2, and an electric-motor armature consisting of a core I^3 and wire windings I^4, passing through the casing, rim, and core, substantially as and for the purpose specified.

GEORGE S. STRONG.

Witnesses:
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